

CLAIMS:

1. A dispenser comprising a housing, a pressure sensor, processing means and a display means, the housing being shaped for receiving, in use, a dispensing container of the type containing medicament and having valve means for dispensing the medicament in metered volume doses, wherein, in use, the pressure sensor is capable of detecting a pressure signature produced on dispensation of medicament from the dispensing container, wherein the pressure sensor is operatively connected to the processing means for relaying signals indicative of the pressure signature for processing by the processing means, the processing means being programmed to analyse said signals and compare said signals against one or more data sets containing data indicative of one or more control pressure signatures, the processing means being programmed to use a result of said comparison to detect the quantity of medicament dispensed compared to an intended volume of the metered dose volume.
2. A dispenser as claimed in claim 1 wherein the processing means is programmed to output a first signal to the display means when said comparison indicates that the quantity of medicament dispensed substantially matches an intended volume of said metered volume dose to thereby update the display means to reflect that a metered volume dose has been dispensed.
3. A dispenser as claimed in claim 1 or claim 2 wherein the processing means is programmed to produce a second signal when said comparison indicates that the quantity of

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medicament dispensed is substantially less than an intended volume of said metered volume dose.

4. A dispenser as claimed in claim 3 wherein the second
5 signal contains data indicative of the proportion of the intended volume of said metered volume dose actually dispensed.

5. A dispenser as claimed in claim 3 or claim 4 wherein
10 the second signal, or a derivative thereof, is used to update the display means to reflect that a proportion of a metered volume dose has been dispensed.

6. A dispenser as claimed in any of claims 3 to 5 wherein
15 the second signal, or a derivative thereof, is used to produce an alert to instruct a user to administer a further dose.

7. A dispenser as claimed in any of claims 3 to 6 wherein
20 the processing means contains an accumulated volume variable indicative of the accumulated volume of medicament dispensed by the dispensing container.

8. A dispenser as claimed in claim 7 wherein the second
25 signal, or a derivative thereof, is used to update the accumulated volume variable.

9. A dispenser as claimed in claim 8 wherein the
accumulated volume variable is used to update the display
30 means to indicate the quantity of medicament dispensed from the dispensing container and/or the quantity of medicament remaining in the dispensing container.

10. A dispenser as claimed in any preceding claim wherein the processing means analyses one or more of the frequency, duration, area, rising slope, falling slope and amplitude of
5 the pressure signature.
 11. A dispenser as claimed in claim 10 wherein the processing means applies a band-pass filter to the pressure signature.
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12. A dispenser as claimed in claim 10 or claim 11 wherein the processing means selects a signature envelope for further signal processing.
 - 15 13. A dispenser as claimed in any of claims 10 to 12 wherein the processing means applies a notch filter to the pressure signature to slice the signature into discrete segments of equal time duration.
 - 20 14. A dispenser as claimed in claim 13 wherein the processing means compare the number of signal-containing segments with a control number derived from the one or more data sets.
 - 25 15. A dispenser as claimed in any preceding claim wherein the pressure sensor is an acoustic sensor and the pressure signature is an acoustic signature.
 - 30 16. A dispenser as claimed in any of claims 1 to 14 wherein the pressure sensor is selected from the group consisting of a vibration sensor, a strain sensor, a compression sensor, a deflection sensor and a flow sensor.

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17. A dispenser as claimed in claim 15 wherein the acoustic sensor is a microphone.

5 18. A dispenser as claimed in claim 17 wherein the microphone is a micro-electro-magnetic microphone.

19. A dispenser as claimed in claim 15 wherein the acoustic sensor comprises piezoelectric material.

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20. A dispenser as claimed in any preceding claim wherein the pressure sensor is contacted, in use, by the dispensed medicament.

15 21. A dispenser as claimed in claim 20 wherein the pressure sensor is deflectable by the impact of medicament during dispensation to thereby produce the pressure signature.

22. A dispenser as claimed in claim 21 wherein the pressure
20 sensor comprises a piezoelectric strip in the form of a cantilever.

23. A dispenser as claimed in claim 21 wherein the pressure sensor comprises a piezoelectric surface in the form of a
25 drum-skin.

24. A dispenser as claimed in any of claims 1 to 19 wherein the pressure sensor is isolated, in use, from contact with the dispensed medicament.

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25. A dispenser as claimed in claim 24 wherein the pressure sensor is located in acoustic contact with an acoustic chamber.

5 26. A dispenser as claimed in claim 25 wherein the dispensing container received, in use, in the housing is of the type comprising a valve stem through which the medicament is dispensed, the housing further comprising a stem block for receiving said valve stem, the stem block
10 comprising a conduit for directing medicament dispensed through said valve stem towards an outlet of the dispenser, wherein the acoustic chamber is located in acoustic contact with the conduit.

15 27. A dispenser as claimed in claim 26 wherein the acoustic chamber is located within the stem block.

28. A dispenser as claimed in claim 26 or claim 27 wherein the pressure sensor is located on an external surface of the
20 stem block.

29. A dispenser as claimed in any of claims 25 to 28 wherein the pressure sensor forms one wall of the acoustic chamber.

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30. A dispenser as claimed in any preceding claim comprising a pyroelectric sensor for detecting temperature changes within the housing during dispensation of medicament.

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31. A dispenser as claimed in claim 30 wherein the pyroelectric sensor is operatively connected to the

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processing means for relaying signals indicative of the temperature for processing by the processing means.

32. A dispenser as claimed in claim 31 wherein the
5 processing means is programmed to analyse said temperature
signals and compare said signals against one or more data
sets containing data indicative of one or more control
temperature signatures, the processing means being
programmed to use a result of said comparison to detect the
10 actuation of the dispensing container.